CASE 3043.FDI

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF
BILLMERS, ET AL.
S.N.: 10/646,429
FILED: 22 AUGUST 2003
FOR: STARCHES FOR REDUCED FAT IN FRIED FOOD SYSTEMS

GROUP ART UNIT: 1761
EXAMINER: TRAN LIEN, THUY

Commissioner of Patents and Trademarks
PO Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER RULE 132 (37 C.F.R. §1.132)

Sir:

I, Yadunandan Dar, a citizen of the United States, currently residing at 10 Leahy Court, Somerset, New Jersey 08873 declare as follows.

I am familiar with the issues raised in this case.

I graduated from Indian Institute of Technology (Mumbai, India) in 1994 with a Bachelors of Technology in Chemical Engineering, and from Michigan Technological University (Houghton, MI) in 1999 with a PhD in Chemical Engineering. I have been employed by National Starch and Chemical Company, now National Starch LLC, (NSC) since 1999.

I have held a variety of technical roles within NSC including in Material Science (material properties of polymers including starch, adhesives, and resins); in Chemistry (synthesis and development of new molecules and polymers inclusive of modified starch), in Advanced Polymer Dispersions (manager), in the Automated Experimentation Laboratory (managed

development and validated high throughput experimentation for starch), and in Applied Research (modeling of various systems). I now hold the title of Senior Manager, Applications.

Throughout these positions, I have contributed to new product developments in a variety of areas including starch. In particular, the Automated Experimentation Laboratory is cutting edge technology which will advance and expedite discovery and validation of new starches, their properties, functions and uses.

Since 2008, I have managed applications technology, first directing the soups, sauces, gravies, and dressings application team and then additionally directing bakery, snacks and general food applications. In this position, my expertise is directed towards the research and development of new starch and natural polymer blends and their use in food applications to provide novel and unique functional benefits. To do this I have utilized my knowledge of polysaccharide chemistries, formulation science, as well as polymer science and engineering and explored the use of new and non-traditional sources in combination with both traditional and innovative chemistries in my work. Overall, my work has given me a strong background in the development of native and modified polysaccharides and their use for a variety of applications and functionalities.

I have experience in fried foods, such as French fries, and manage several projects in this field. I have contributed to new product developments in this area and others, and have been responsible for launching new products and blends as well as their use in food applications globally. Such has included advances in reduced fat products, gluten-free products, advances in the use of resistant starch, and low/reduced calorie products.

I am the inventor of seven U.S. patents or applications and numerous non-US patents and applications. I have authored numerous peer-reviewed publications and have presented at a variety of international conferences. National Starch was recently honored with the International Food

Technologists (IFT) Innovation Award for my work in using clean-labeled starches in salad dressing.

The experiments below were conducted under my supervision and guidance to compare the fat reduction of French fries prepared with the succinated starch esters of the present invention with that prepared with a combination of the succinate starch ester with flour.

**Materials**

Waxy corn succinated starch ester (50 wf) = WCS
Potato succinated starch ester (85 wf) = PS
Wheat flour (Gold Medal All Purpose) = WF
Fresh potatoes
Vegetable oil
Calcium chloride dehydrate solution (0.625%)

**Samples** (ratios are on a weight/weight basis)

WCS
WCS:WF, 72:28
WCS:WF, 82.5:17.5
WCS:WF, 93:7

PS
PS:WF, 72:28
PS:WF, 82.5:17.5
PS:WF, 93:7

**Procedure**

The procedures of the examples section of US 2005/0042331 were used. In brief:

- Fresh potatoes were rinsed, peeled, and sliced into 0.375" (9/5mm) X 0.375" (9.5mm) X 3" (76.2mm) strips. The potato strips were then rinsed in cold water to remove starch and sugars.
- The strips were blanched at 70-75°C for 11 minutes in a 0.625% calcium chloride dehydrate solution and dried to a moisture loss of about 13-16% by weight.
- The blanched potato strips were then soaked in a 5% starch succinate cook (pre-heated to 71°C, cooled to 49°C) and dried to a moisture loss of about 18-22% by weight.

- The coated strips were par-fried in vegetable oil at 365°C for 45 seconds and frozen at -20°C.
- The frozen, coated strips were finished by frying at 365°C for 2.5 minutes.
- Note: A control was made in which the potato strips were not soaked in starch succinate solution and were blanched in water without added calcium chloride dihydrate. Otherwise, the same process was followed for the control.

The percent fat and the fat reduction were determined by an independent lab using the method of the example section.

**Results**

The fried potato strips were prepared as stated above. The waxy corn succinate starch ester cook was of desired consistency as was expected. The potato succinate starch ester cook was unexpectedly thin with very low apparent viscosity noted. It was still used in the experiment as we did not have time to prepare another sample to meet the required deadline.

| Sample | Total fat (%) | Fat reduction (%) |
|---|---|---|
| Control | 9.33 | N/A |
| WCS | 7.14 | 23.5 |
| WCS:WF, 93:7 | 7.75 | 16.9 |
| WCS:WF, 82;5:17.5 | 7.69 | 17.6 |
| WCS:WF, 72:28 | 7.43 | 20.4 |
| PS | 8.05 | 13.7 |
| PS:WF, 93:7 | 8.09 | 13.3 |
| PS:WF, 82;5:17.5 | 7.57 | 18.9 |
| PS:WF, 72:28 | 8.15 | 12.6 |

**Analysis and conclusions**

The control had the highest fat content as was expected. The waxy corn succinate alone had the lowest fat content. Both the succinated starches reduced the fat content, resulting in reduced fat French fries. Adding flour to the waxy corn succinate raised the fat content over the waxy corn succinate alone. This was also expected as the flour does not prevent fat pickup.

The starch succinate cook using the potato starch had unexpectedly low viscosity. This was possibly indicative of damage to the starch used as the source for this work. The fat reduction trend was also not consistent with what had been observed previously and what was expected from this experiment. The starch was therefore examined under a microscope and found to be significantly damaged as evidenced by the attached Figure 1 micrograph. Figure 2 shows a fully hydrated unsuccinated potato starch cooked under the same conditions. Thus, the potato succinate coated French fry results were neither considered as

representative of the application nor accurate. In comparison, the waxy corn succinate starch viewed under a microscope (Figure 3 micrograph) shows fully gelatinized granules which facilitate the anticipated fat reduction of the French fries as set forth in the application.

Thus, it is clear that the starch succinate coating reduces oil pickup and consequently reduces the fat content of fried foods. The addition of flour interferes with this functionality of the starch succinate coating such that the addition of flour increases the fat content of the fried foods.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by a fine or imprisonment or both under 1001 of Title 18 of the United States Code and such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed at Bridgewater, NJ, this January 21, 2011.

location date

Yadunandan Dar

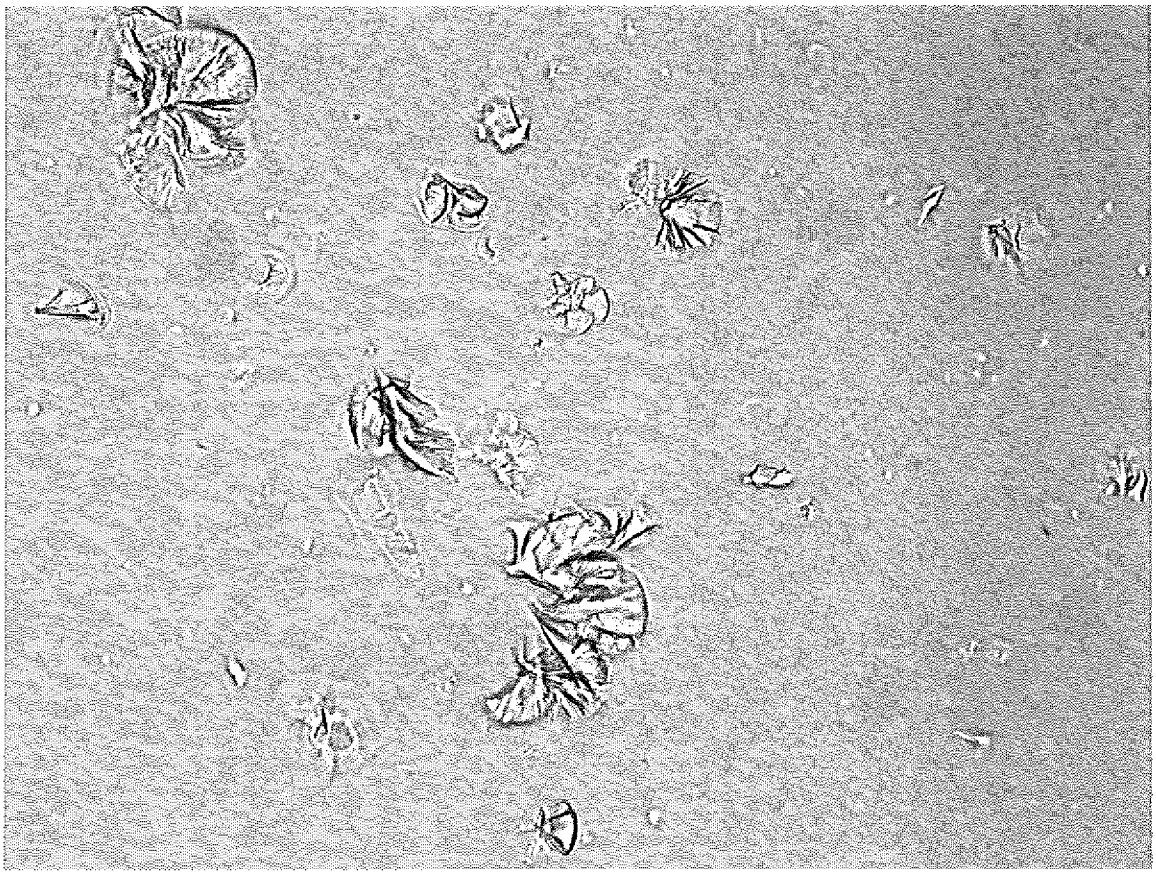

Fig. 1 Succinated Potato Starch – Cooked to 71°C and held 20 min; Shows fragmented, non-fully hydrated granules (indicates issue during preparation)

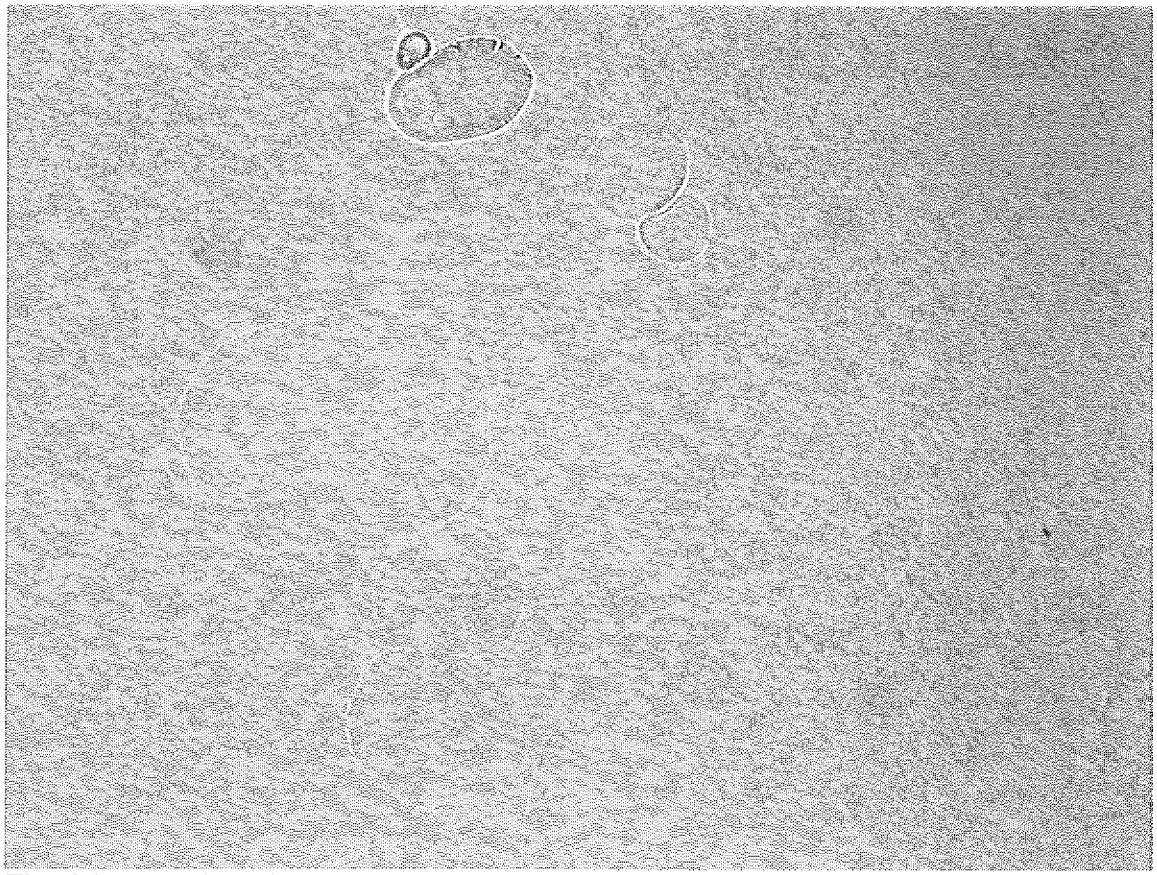

Fig. 2 Potato Starch - Cooked to 71°C and held 20 min; shows intact and fully hydrated granules

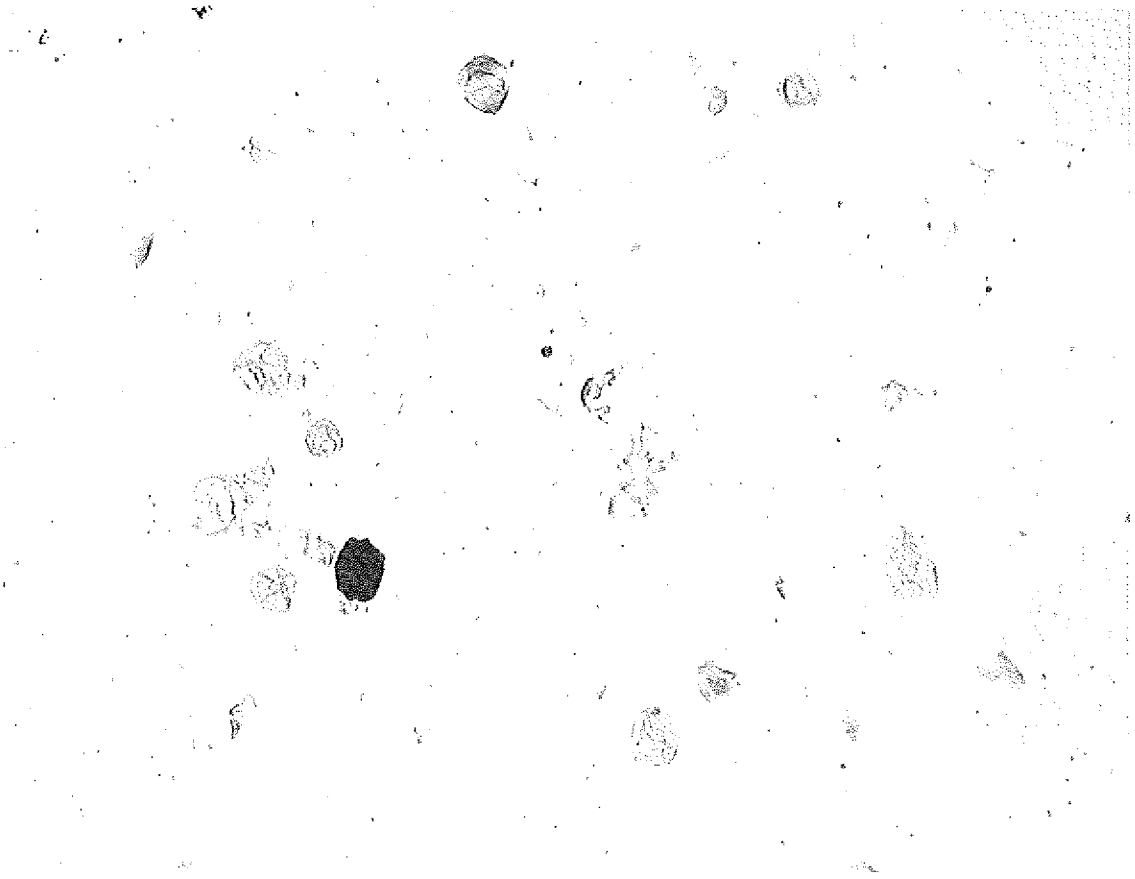

Fig. 3 Succinated Waxy Corn Starch – Cooked to 71°C and held 20 min; shows mostly fully intact, fully hydrated granules. This micrograph was prepared at 200X magnification vs. 100X magnification for the potato micrographs (Figure 1 and 2 above). The difference in magnification is due to the different sizes of the two starch granules, potato being much larger.

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